Background document #1

Operationalising 'adaptation limits' in a policy context

The limits to adaptation are identifiable thresholds beyond which adaptation does not represent a viable strategy in the sense of failing to protect what individuals and societies value. In this note, we focus on the extent it is possible to operationalise limits to adaptation, in particular on what are often referred to as losses (i.e. cannot be compensated as there is no commensurable elements) but more often to as non-economic loss and damage.

The common distinction within research on Loss and Damage and in the climate regime, appears to be that losses include phenomena that are not able to be compensated, while damages are sometimes able to be replaced or substituted. Damages therefore include impacts of climate changes such as on infrastructure, settlements, and biological systems. This distinction appears to overlap with the Warsaw discussions on so-called economic losses and damage compared to non-economic loss and damage.

The steps to operationalising limits to adaptation, assuming those limits represent thresholds beyond which there are no easily compensated losses and damage, include:

- Requirements to have observable thresholds;
- Requirements to have metrics or measures of the non-standard losses;
- Need for a governance mechanism that addresses those losses that are not able to be compensated, through restorative justice, recognition justice or some other means.

The requirement for **observable thresholds** is well- researched and understood to be of different nature in physical and biological systems compared to social systems. Mechler and colleagues summarise a scientific convergence that Loss and Damage refers to the adverse climate-related impacts from both sudden-onset events (floods, wildfire, and cyclones) and slower-onset processes, including droughts, sea-level rise, glacial retreat, and desertification (Mechler et al., 2020). In essence impacts of current and projected climate changes beyond 1.5 C have consequences for ecosystems such as coral reefs, wetlands, desiccated regions and low-lying land that cross thresholds.

There is less knowledge concerning the nature of thresholds in many natural systems. Much ecological science that has observed whole system changes suggests that there are three major types of thresholds: those that involve a non-linear regime shift at a certain threshold, but reverses below the threshold; those that involve irreversible regime shifts; and those that involve non-linear changes that could be reversible, but at very different thresholds once crossed (Peterson, 2009). But in general, many changes in ecosystems are in effect soft, or at least unknown, limits and adaptation investments bring multiple benefits from precautionary action.

The second requirement is for **metrics or measures of losses**, especially for those classified under the Warsaw Mechanism as non-economic loss and damage. These are life, mobility, health, territory, cultural heritage, indigenous knowledge, social identity, biodiversity and ecosystem services. This list appears to be deliberately comprehensive and inclusive of all possible consequences of climate change that are not financial and not commonly traded in markets. They refer to elements that relate to individuals, communities, or the environment more widely. The assumption is that these cannot be operationalised as monetary compensation is not adequate for their loss.

There are, however, well established metrics for at least some of those categories of losses that are relevant for policy-makers and resource allocations. The majority of impacts of climate change on well-being may occur through changes in ecosystem services. And the research community, spurred by the Millennium Ecosystem Assessment, have standardised ways of monitoring ecosystem services and accounting, at least in part, for the consequences of their loss. Similarly, the impacts of climate change on individual human health are widely reported and themselves are the object of policy interventions. Hence the consequences of extreme weather events on mortality risk, on morbidity and other outcomes for non-communicable diseases, are the subject of global surveillance and well-established metrics. This is exemplified in the 41 sets of indicators from the Lancet Countdown process (Romanello et al., 2022), and from alternative metrics such as the so-called mortality cost of carbon – estimated excess deaths per unit emission (Bressner, 2021). The mental health burden of climate change impacts, and of loss of ecosystem services, while previously a black box, has been illuminated through studies of many different weather extremes, including wildfire risk and flooding. The English National Flood Study, for example, detailed the increased mental ill-health burden through prevalence of anxiety, depression, and PTSD among flooded households over a large sample of lowland England over five years (Mulchandani et al. 2020).

While other elements of non-economic loss and damage such as loss of cultural heritage, elements of identity, and indigenous knowledge, have less standard observed consequences, even their loss can be evaluated in terms of their consequences on loss of well-being or even consequences for mental ill-health. Marhsall et al. (2019), for example, showed how loss of pride and place attachment among residents of the Great Barrier Reef region in Australia, had identifiable loss of perceived well-being after major coral bleaching events and the discourse of permanent potential loss of reefs that are important for their sense of place. Wewrinke-Singh (2022) reports on research that the right to healthy environments has in itself led to policy change and amended priorities in those countries which had adopted such rights in national legislation. This may, she argues, become more prominent with the adoption of a healthy environment right under the UN General Assembly in 2022.

The category of mobility as an element of non-economic losses is an example of a category of loss that appears to be a catch-all for undesirable social change. Involuntary displacement from place of residence is a common outcome of weather extremes – predominantly temporary, but always traumatic (Betts, 2013). Displacement has been shown to lead to many negative well-being and health consequences, including loss of sense of place and identity, and lowered economic and life opportunities (Munro et al. 2018). The category of mobility seeks to incorporate such loss, but is open to interpretation in other ways. In addition, many adaptation interventions are designed to minimise the risk of temporary or permanent displacement with those losses in mind. At the same time, however, not all movement of populations can be regarded as loss, given that migration is an effective and common individual adaptation response to the changing opportunity landscape brought about by climate change. Hence there are no easily identifiable metrics and indicators for mobility as a category of loss, both because it has multiple outcomes and because the category includes elements that are not specifically losses.

In summary, the operationalisation of adaptation limits as thresholds beyond which losses and damages appear relies on being able both to identify those thresholds, and on metrics and measures of the diverse elements of loss. The picture is mixed. Some thresholds of limits are known, but all are contested depending on societal perceptions of acceptable risks. Some arenas of loss outside of economic losses, have appropriate metrics and measures which are significant in policy making and goals. But other categories are less easily captured. But measures of loss are not a pre-requisite for

fair and sustainable compensation as long as compensation is treated as beyond financial transfers, but includes words and actions derived from recognitional and restorative justice.

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Acknowledgements

Neil Adger (University of Exeter) authored this document. Funding from Wellcome Trust (Grant 216014/Z/19/Z) and IDRC Justice in a Changing Climate Change (Grant 109741-002) is gratefully acknowledged.